

Activity Title: How to Be a Shipwreck Detective

Subject: NOAA Ocean Careers—Oceanographers

Grade Level: 3-6

Average Learning Time:

- Teaching the lesson— one class period
- Student research, activity and assessment—two class periods

Lesson Summary (Overview/Purpose):

Using the *OceanQuest* webquest (<http://truomass.org/OCEANQUEST.htm>) students will take on the role of a NOAA oceanographer by researching autonomous underwater vehicles and underwater archaeology and apply acquired knowledge to solve a real life problem.

Overall Concept (Big Idea/Essential Question):

The ocean encompasses 71% of the Earth, and much of it is still undiscovered. NOAA oceanographers study the ocean and the plants and animals it contains. They can also work with hydrographers and underwater archeologists. They use cutting edge technology and historical data to locate and identify shipwrecks and other items of historical significance on the ocean floor.

Specific Concepts (Key Concepts):

Upon completion of the lesson, students will communicate how NOAA oceanographers and their colleagues use technology and historical data to locate items of historical significance underwater. Through the use of a PowerPoint presentation, students will demonstrate understanding of Autonomous Underwater Vehicles (AUVs); Remotely Operated Vehicles (ROVs) and Human Occupied Vehicles (HOVs) and the role this technology played in attempting to locate a Revolutionary War shipwreck. Students will apply this knowledge to identify another historical shipwreck using a list of artifacts and historical documents using the NOAA activity “Be A Shipwreck Detective”.

Focus Questions (Specific Questions):

1. What underwater vehicle technologies do oceanographers use to explore the sea floor?
2. How do oceanographers depend upon other scientists to complete their research?
3. How do oceanographers use historical data to complement their scientific research?
4. Besides modern technology, what other tools can oceanographers use to identify objects on

Objectives/Learning Goals:

- A) Students will prepare a PowerPoint presentation that addresses the following:
1. Identify how the search for the Revolutionary War ship *Bonhomme Richard* began.
 2. Identify how oceanographers fine-tuned their search using hydrographic data and historical records to attempt to identify the *Bonhomme Richard*.
 3. Identify three types of underwater vehicles used by oceanographers.
 4. Use a list of artifacts found around a shipwreck in Stellwagen Bank to determine
 - the age of the vessel
 - the makeup of the passengers
 - the means by which the vessel was powered
 - what caused the vessel to sink
 - the identity of the vessel
- B) Using the *OceanQuest* webquest, students will assume the role of oceanographer and propose how, if given the opportunity to identify a newly discovered shipwreck, how they would go about it.

Background Information:

n/a

Common Misconceptions/Preconceptions:

n/a

Materials:

- Computer or tablet with Internet connection
- Photocopies of the List of Artifacts and Grid Reference System from the NOAA “Be A Shipwreck Detective” lesson
(<http://celebrating200years.noaa.gov/edufun/book/BeShipwreckDetective.pdf>)
- PowerPoint or similar presentation software

Technical Requirements:

- Computer or tablet with Internet connection

Teacher Preparation:

Teachers should become familiar with the *OceanQuest* webquest prior to teaching the lesson.

Keywords:

oceanographer
autonomous underwater vehicle
hydrography
sonar

Pre-assessment Strategy/Anticipatory Set:

n/a

Lesson Procedure:

1. Introduce the *OceanQuest* webquest. Teachers can use the “Be a Shipwreck Detective” section of the webquest as a part of the whole webquest (group project) or as an individual lesson (individual project). See <http://truromass.org/oceanquestoceanographers.htm> to view the entire “Process” for the Oceanographers portion of the webquest.
2. Explain to students that they will be assuming the role of a NOAA oceanographer. They will read an article about how researchers use technology to try to determine the location of a historic shipwreck.
3. Next, explain that students will research three different types of underwater vehicles and investigate how one of these vehicles was used in attempting to identify that historic shipwreck.
4. Explain that students will use this information, along with a list of artifacts, a historic document and a grid reference system to identify a shipwreck in Stellwagen Bank.
5. Review how to use a grid system.
6. Note: If using this lesson as part of the whole *OceanQuest*, there will be a need to assign a group of students to this Task.

Assessment and Evaluation:

Students will complete a PowerPoint presentation that addresses the Objectives/Learning Goals

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National Science Education Standards Addressed:

Science as Inquiry Standards:

Abilities necessary to do scientific inquiry; Understanding about scientific inquiry

Physical Science Standards:

Properties of object and materials; Motions and

forces Science and Technology Standards:

Abilities of technological design; Understanding about science and

technology History and Nature of Science Endeavors Standards:

Science as a human endeavor; History of science

Ocean Literacy Principles Addressed:

Principle #6: The ocean and humans are inextricably interconnected.

c. The ocean is a source of inspiration, recreation, rejuvenation and discovery. It is also an important element in the heritage of many cultures.

Principle #7: The ocean is largely unexplored.

a. The ocean is the last and largest unexplored place on Earth—less than 5% of it has been explored. This is the great frontier for the next generation’s explorers and researchers, where they will find great opportunities for inquiry and investigation.

b. Understanding the ocean is more than a matter of curiosity. Exploration, inquiry and study are required to better understand ocean systems and processes.

d. New technologies, sensors and tools are expanding our ability to explore the ocean.

Ocean scientists are relying more and more on satellites, drifters, buoys, subsea observatories and unmanned submersibles.

f. Ocean exploration is truly interdisciplinary. It requires close collaboration among biologists, chemists, climatologists, computer programmers, engineers, geologists,

meteorologists, and physicists, and new ways of thinking.

Massachusetts State Science& Technology Standards Addressed:

Physical Sciences Gr. 3-5

Properties of Objects and Materials: 1. Differentiate between properties of objects (e.g., size, shape, weight) and properties of materials (e.g., color, texture, hardness).

Sound Energy: 11. Recognize that sound is produced by vibrating objects and requires a medium through which to travel.

Technology/Engineering Gr. 3-5

1. Materials and Tools: *Central Concept:* Appropriate materials, tools, and machines extend our ability to solve problems and invent. 1.3: Identify and explain the difference between simple and complex machines

